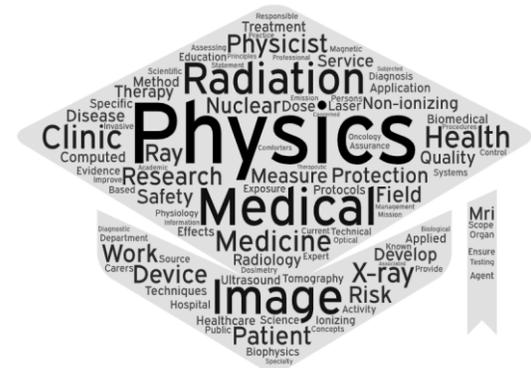


Using physics to prevent, diagnose, and treat disease

Medical physics is a *scientific discipline* focused on all possible uses of physics and physical sciences in medicine.

Medical physics is also a *clinical profession* largely in charge of safe implementation and use of radiation technology in hospitals.

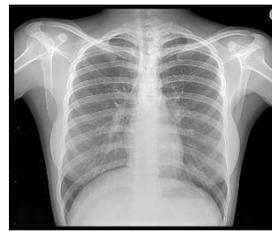


Research in medical physics covers a wide range in the physics of:

- Medical imaging
 - CT, MRI, PET, ultrasound, optical
- Medical therapies
 - Radiation, photonic, and ultrasonic therapy, therapy guidance
- Medical diagnostics
 - EEG, ECG, oximetry, blood pressure measurements
- Medical technologies
 - Surgical hardware, decision systems, medical accelerators
- Disease states
 - Cancer, neuro-degenerative, musculoskeletal
- Normal physiology
 - Immune system, vascular system

Clinical medical physics includes:

- *Imaging* of the human body



X-ray



PET



Ultrasound

- *Treating* disease
 - Radiation therapy
 - Ablation therapies
 - Targeted therapies



- *Ensuring safety* from radiation



What does the research look like?

- Collaboration across disciplines
- Instrumentation and technology development and validation
- Machine learning and AI
- Biomarker discovery
- Image analysis
- Clinical trials



What do medical physicists do?

Some examples...

- Plan patient dose and monitor machines
- Create better imaging devices for more precise medicine
- Extract information from images to better characterize disease
- Teach the next generation of medical physicists



Types of careers in medical physics

Academia

Research

Teaching

Clinic

Clinic

Radiotherapy

Diagnostic imaging

Nuclear medicine

Health Physics /
Radiation safety

Industry

Developing technology
(hardware and
software)

Customer training

Program and product
management

Other

Government

Publishing

Law

Business (leadership
and entrepreneurship)

Paths to medical physics careers

Graduate Programs

- **Masters of Science** in Medical Physics (M.S.)
 - 2-3 years coursework + written, defended thesis and/or qualifying exam
- **Doctor of Philosophy** in Medical Physics (Ph.D.)
 - 2 years coursework + 2-4 years of research culminating in a written, defended thesis contributing a new idea to the field

Residency Training for Clinic

- In addition to graduate school, M.S. minimum
 - 2 years of clinical training

Typical Graduate Programs Application Requirements:

- B.S. in physics or the equivalent of a physics minor
 - Other common degrees: Computer Science, Engineering (Electrical, Computer, Nuclear, Biomedical), Mathematics, Biochemistry
- Research, internship, or shadowing experiences all enhance applications



Summer Research Opportunities for Undergraduates

- American Association of Physicists in Medicine (AAPM)
 - Summer Undergraduate Fellowship Program
 - Diversity Recruitment through Education and Mentoring Program (DREAM)
- Research Experiences for Undergraduates (REU) from the National Science Foundation